



Effect of replacement of maize with water hyacinth foliage on nutrient utilization in crossbred (Hampshire × Ghungroo) grower pigs

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Farmers are unable to go for intensive pig farming because of high cost of feed ingredients, hence they traditionally go for new feed resources which are available locally and economically viable for livestock production. Water hyacinth (*Eichhornia crassipes*) is one such new feed resource for pig. Water hyacinth foliage is commonly used as a supplementary feeding for pigs (Le *et al.* 2006, Jafari 2010). A maximum inclusion rate of 6–7% (on DM) was considered economically viable (Le *et al.* 2006) because of presence of anti-nutritional factors in it (Mako *et al.* 2011). In the present studies, water hyacinth foliage was used at different levels by replacing maize on growth and nutrient utilization in crossbred grower pigs.

Eighteen crossbred (Hampshire × Ghungroo) grower male pigs (3.5 months old; body weight ranging from 30.05±4.70 to 30.83±1.60 kg) were divided into 3 groups of 6 each in a randomized block design. The pigs were fed as per BIS (1986) feeding standard on 3 different types of grower rations supplemented with 3 different levels of water hyacinth foliage (*Eichhornia crassipes*) @ 0, 5 and 10 % by replacing (DM basis) the maize namely T₁ (maize- 60.0, wheat bran- 10.5, soybean meal- 14.0, groundnut- 13.0, water hyacinth foliage 0.0, mineral mixture- 2.0, common salt-0.50); T₂ (maize- 55.0, wheat bran-10.5, soybean meal-14.0, groundnut- 13.0, water hyacinth foliage 5.0; mineral mixture- 2.0, common salt-0.50) and T₃ (maize- 50.0, wheat bran-10.5, soybean meal- 14.0, groundnut- 13.0, water

hyacinth foliage 10.0, mineral mixture 2, common salt-0.5). Additionally, 40 g phytase enzyme, 0.04 % lysine and 0.01 % methionine were added to all diets. Water hyacinth foliage was supplemented on fresh basis. The pigs were fed on the experimental rations twice daily in the morning and evening. The experiment was conducted for 3 months. Digestibility trial was conducted at the middle of the experiment. Proximate composition was done as per AOAC (1990). Data were analyzed using one way ANOVA as per method of Snedecor and Cochran (1989).

The crude protein content of all the experimental rations was similar while the protein content (% DM) of water hyacinth foliage was 9.45±0.03 (Table 1). The digestibility coefficient of dry matter, organic matter, crude protein, ether extract and nitrogen free extract was similar in T₁, T₂ and T₃ groups (Table 2) while digestibility coefficient of crude fibre reduced significantly (P<0.01) in T₃ group. Although there was no significant difference in digestibility of nutrients between T₁ and T₂ groups, but digestibility of CP and CF were partially lower (P>0.05) in T₂ group (Table 2), which might be due to the presence of hydrolysable and condensed tannins as well as its high fibre content (Mako *et al.* 2011), which reduces digestibility of nutrients (Ly *et al.* 2002, Dominguez *et al.* 1996).

Average feed intake (kg/d) ranged from 1.13±0.03, 1.11±0.03 and 1.14±0.03 in T₁, T₂ and T₃ groups, respectively, and was similar across all treatment groups.

Table 1. Proximate composition of experimental rations

Ration	OM %	CP %	CF%	EE %	Ash %	NFE %
T ₁	93.72±0.60	18.44±0.31	8.33±0.64	2.35±0.34	6.28±0.60	64.61±1.88
T ₂	94.21±0.12	18.42±0.25	7.39±0.45	1.55±0.02	5.67±0.24	66.98±0.46
T ₃	91.79±0.60	18.40±0.27	6.74±0.07	2.27±0.09	8.21±0.60	64.38±0.31
WH	91.70±0.51	9.45±0.03	18.38±0.20	3.16±0.11	8.61±0.46	60.41±0.74

T₁= Control; T₂= 5 % replacement of maize with WH; T₃= 10 % replacement of maize with WH; WH=Water hyacinth

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Average growth rate (g/day) ranged from 260.6±48.2 to 365.9 ±85.6 in T₃ and T₂ group, respectively, and the value for other group is within this range of variation. There was no significant difference on growth among treatments.

Table 2. Effect of replacement of maize with water hyacinth foliage on digestibility coefficient of nutrients in crossbred grower pigs

Group	DM	OM	CP	EE	CF	NFE
T ₁	82.34±2.71	84.11±2.44	88.95±1.69	62.49±5.74	60.48 ^b ±1.20	86.49±2.07
T ₂	82.54±1.90	84.20±1.72	83.87±1.76	63.58±3.96	59.38 ^b ±1.51	88.29±1.29
T ₃	79.90±1.84	81.32±1.72	83.88±1.48	60.60±3.62	42.69 ^a ±1.26	85.18±1.33
P Value	0.67	0.57	0.18	0.89	0.004**	0.48

T₁= Control; T₂= 5 % replacement of maize with WH; T₃= 10 % replacement of maize with WH; WH=Water hyacinth, ** (P<0.01)

Higher (P>0.05) growth rate despite lower (P>0.05) protein digestibility in T₂ group in comparison to T₁ group might be due to the presence of well-balanced amino-acids in water hyacinth foliage (Le *et al.* 2006). The feed conversion ratio ranged from 3.70±1.03 to 5.12±1.37 in T₂ and T₃ group, respectively, and other fall within this range of variation. There was no significant difference on feed conversion ratio among treatments. Although, feed cost/kg gain was similar across all treatments, it was reduced by ₹ 3.42/ kg gain in 5 % replacement of concentrate by water hyacinth foliage (T₂ group) than control. Similarly, Dominguez *et al.* (1996) reported that inclusion of water hyacinth in pig diets resulted in reduction in digestibility specially of protein, fibre and energy of the whole diet. In support of this present finding, earlier studies have also reported (Le *et al.* 2006) that water hyacinth foliage could be included in the pig ration up to 7 % without any adverse effect on nutrient utilization.

SUMMARY

Eighteen crossbred (Hampshire × Ghungroo) grower male pigs (3.5 months old; 30.05±4.70 to 30.83±1.60 kg) were divided into 3 groups of 6 each in a randomized block design. The pigs were fed on 3 types of experimental diets containing water hyacinth (*Eichhornia crassipes*) @ 0, 5 and 10 % by replacing maize and designated as T₁, T₂ and T₃ groups respectively. There was no difference in DM intake (kg/d) across the groups. Digestibility coefficients (%) of nutrients were similar across the groups except crude fibre digestibility which was reduced significantly in T₃ group in comparison to other 2 groups. The average body weight gain (g/day) was statistically similar across all groups. The feed conversion ratio and cost of production per kg live weight was similar in all the groups. However, feed cost per kg gain was reduced (P>0.05) by ₹ 3.42 in comparison to T₁ group. It is concluded that water hyacinth foliage could replace 5% maize in ration of crossbred grower pigs without any adverse

effect on nutrient utilization.

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